-1933-06

British #394,495
Winkler

(3)

2 SHEETS
SHEET 2

Fig. 5

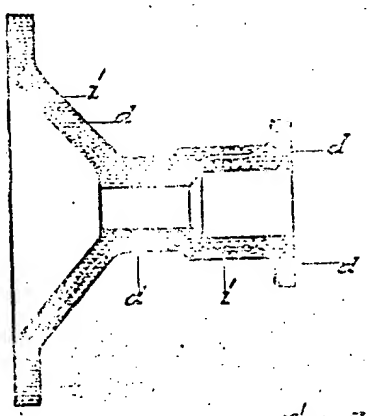


Fig. 8

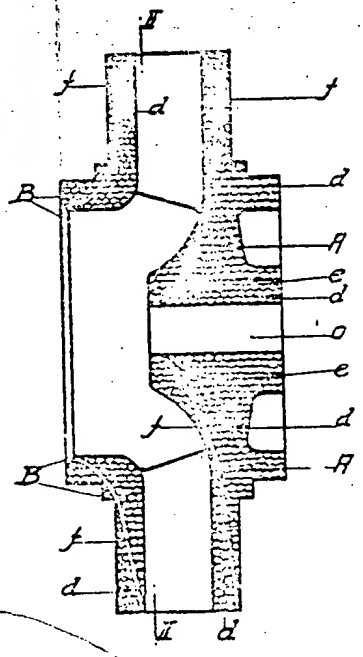
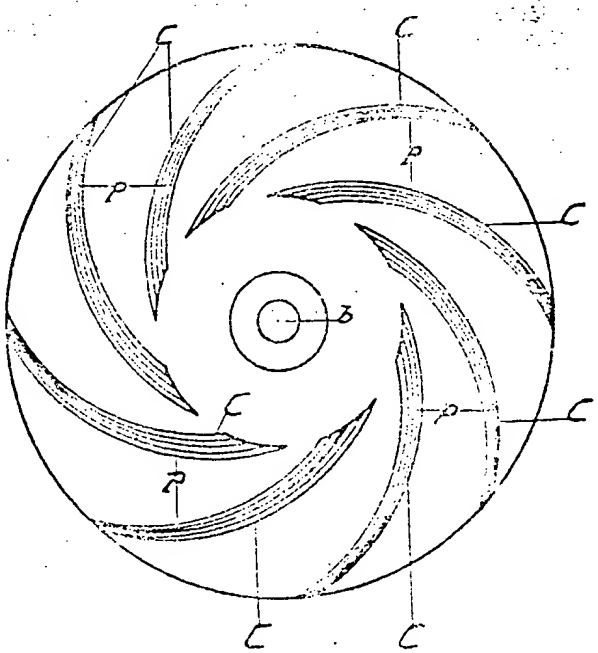


Fig. 9



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BRITISH
#394,495

394,495 COMPLETE SPECIFICATION

SHEET 1

Fig. 1 (WINKLER)

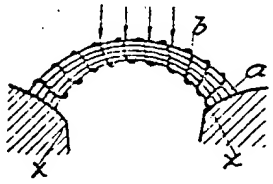


Fig. 2

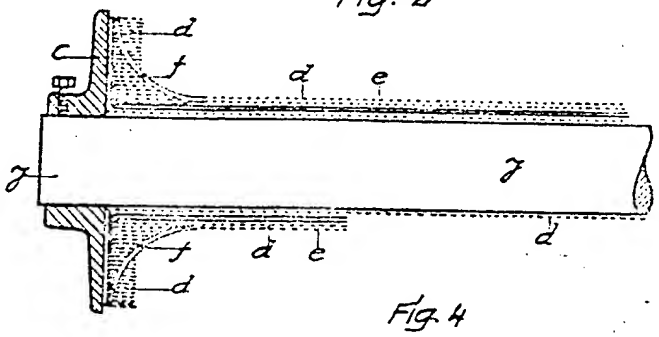


Fig. 3

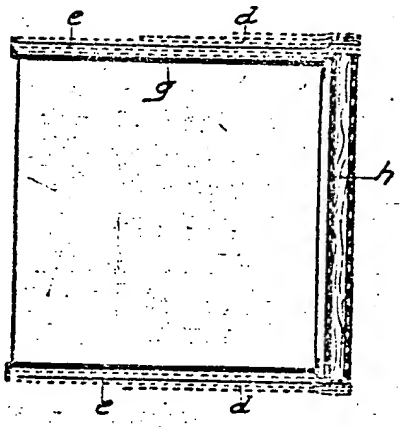


Fig. 4

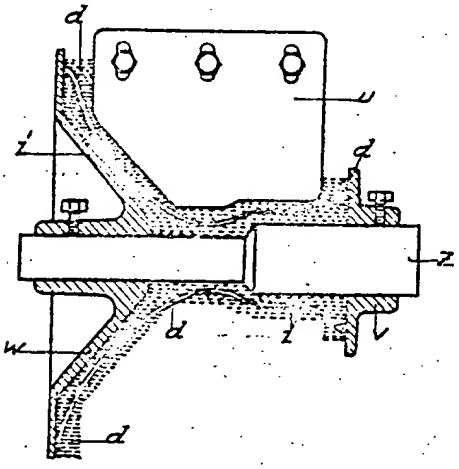


Fig. 5

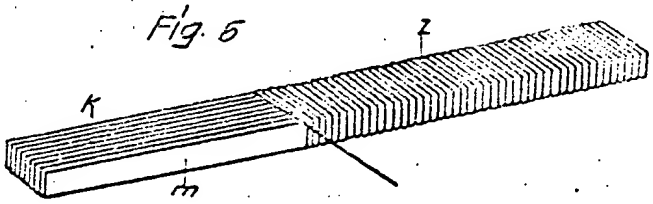
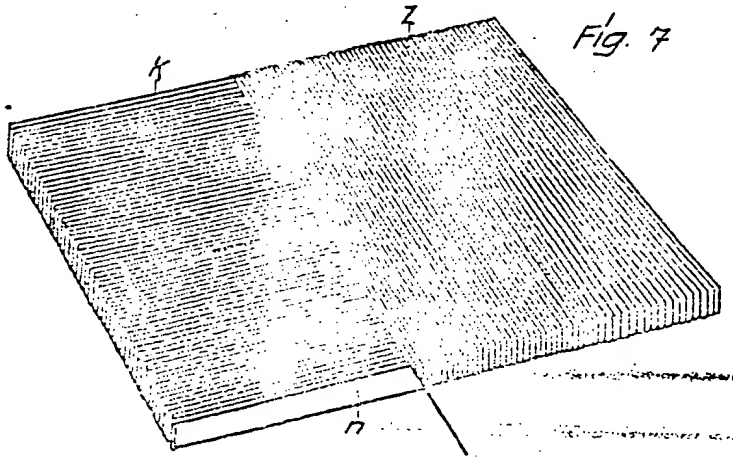


Fig. 7



PATENT SPECIFICATION

Application Date: July 15, 1932. No. 20,073/32. 394,495

Complete Accepted: June 29, 1933.

COMPLETE SPECIFICATION.

Improvements in the Method of Producing Articles from Materials Including Synthetic Resin.

We, EDUARD ESSER & Co., G.M.B.H., of Görlitz, Germany, a German company, and ALBERT WINKLER, of 15A, Reuterstrasse, Görlitz, Germany, a German citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a method of producing non-metallic objects which will resist chemical and physical influences. The materials hitherto known can be used only in the manufacture of objects which are resistant only either to chemical or physical influences. The material usually employed in the production of non-metallic objects unaffected by chemicals consists of a mixture of artificial resin and flakes of fabric. The materials suffers, however, from the drawback that it can withstand only slight mechanical strains and is of a nature which permits hardening only under great difficulties, since the flakes of fabric contained in the mass of artificial resin prevent the escape of the air also contained in the mass, so that bubbles are formed inside the material. In the manufacture of certain classes of objects, such as vessels, conduits, flanges, and, particularly, the bodies of rotary pumps, blowers, and the like, which are subjected also to mechanical strain, the known material cannot be employed for the reasons stated, and only the present invention discloses a method of producing the objects just mentioned in a manner which will comply with all requirements and eliminate the defects of the known processes.

The method according to the invention consists in forming the objects from threads, or the like, saturated with a resin that is unaffected by chemicals and capable of being hardened. The threads are superposed in layers extending in different directions, the direction and thickness of the layers being determined by the degree of mechanical stress.

To particular advantage asbestos threads are employed which during the production of the objects are superposed in layers either mechanically or by hand.

According to the type of objects made, the suitably impregnated threads are wound over forming members which are retained within the object as reinforcement after hardening, or the threads can be wound over a forming member which is removed again from the object after hardening in order to form hollow bodies.

The method according to the invention can be applied with advantage to the manufacture of pump bodies or parts of blowers. In the production of such parts, the threads are arranged partly concentrically to the axis of rotation and partly in layers extending radially thereto, the direction of the layers being adapted to the form of the bodies and the direction of mechanical stress.

By way of example, the invention is illustrated in the accompanying drawing, in which

Figure 1 shows a bracket made according to the invention.

Fig. 2 is a section of a pipe length.

Fig. 3 is a section of a vessel.

Fig. 4 is a section of the cover of a vessel with connecting stuffing box.

Fig. 5 shows a similar section as Fig. 4 after removal of the core required in production.

Figs. 6 and 7 show plates made under the process according to the invention.

Fig. 8 is a section of the impeller or vane wheel of a centrifugal pump.

Fig. 9 is a section on the line II—II, of Fig. 8.

In Fig. 1 a strap or bracket is shown which is loaded in the direction of the arrows and supported with its ends on the lateral abutments *x*. The strap is formed by a number of longitudinally extending threads *a* and the threads *b* which cover the former. The threads consist of asbestos and have been impregnated prior to being worked with artificial resin that is unaffected by chemicals and capable of being hardened. The object produced from the threads in this manner represents a bracket which, as experiments have proved, possesses, when the artificial resin has been hardened, three-fold the bending strength of bars made from known pasty mixtures of artificial resins.

[*Price* 1/-]

In Fig. 2, the end of a flanged pipe is shown which is wound around a metal cylindrical mandrel *y* and consists of single saturated threads. *c* is a flange attached to the mandrel and required for forming the pipe end.

The flanged pipe is made by winding up closely superposed layers of thread extending concentrically to the central axis of the tube. Between the individual layers thread layers *e* extending in the axial direction of the mandrel *y* are inserted. The flange of the pipe is formed by a larger number of thread layers *d* between which the layers *f* extending in a funnel-like fashion are arranged.

The thread layers *d* impart to the pipe the necessary strength to withstand internal and external pressure while the layers *e* and *f*, which extend in axial direction or in a funnel-like fashion, impart to it considerable tensile and bending strength. The thread layers *f* increase the resistance of the flange formed on the end of the pipe to the considerable bending strain which is caused by the flange bolts. The number of superposed thread layers depends on the strain which the pipe is expected to resist.

In Fig. 3 of the drawing a vessel is shown which may be of an oval, round or square shape. In the production of this vessel a winding member *g* is employed to which the part *h* is secured which subsequently forms the bottom of the vessel. The walls of the latter are formed by wound layers *d* between which longitudinally extending thread layers *e* are inserted.

In case of high vessels the number of thread layers may increase from the rim to the bottom of the vessel in accordance with the increase in fluid pressure, as shown in Fig. 3. The edges of the bottom *h* are enclosed by the layers also, and during the subsequent hardening step both the bottom and the cylindrical portion of the vessel will be combined into a jointless unit.

Fig. 4 shows in section the cover of a vessel provided with a stuffing box for the passage of a shaft. In the manufacture of this object a mandrel *z* is employed on both sides of which the forming discs *v* and *w* are provided. To maintain the prescribed wall thicknesses a templet *u* is used, preferably during winding on the winding machine, which is secured to any part of the machine at a proper distance from the mandrel *z* and the forming discs *v* and *w*. The body itself is formed again from the concentric threads *d* and the interposed longitudinally extending threads *i* which are adapted to the form of the vessel. In this manner a body is produced which, owing to correspondingly disposed thread layers, will be equal to any stresses in any direction. After being wound, the body is hardened and then taken off from the forming parts. The finished object will then have the appearance shown in Fig. 5.

A further advantage of the invention becomes apparent when wooden objects are covered with the impregnated asbestos threads, as the thread layers will then form a thorough and durable connection with the surface of the wood, which is due to the fact that the liquid particles of artificial resin enter the pores of the wood and thus firmly join the threads to the wood.

In Fig. 6, by way of example, a rod *m* is disclosed while Fig. 7 shows a wooden plate *n* each of which is covered with a winding *k* and a winding which consist of asbestos threads, the windings being arranged transversely to each other. In this way plates and other objects of any dimensions may be simply and economically produced. It is further possible to produce vessels from plates, as shown in Fig. 7, in which case the plates are assembled to form a vessel and the individual parts are combined by suitable screws or by fusing the resinous binding the hardening operation.

The method according to the invention can further be applied with special advantage to the manufacture of pumps, particularly to making pump casings and vane wheels. For raising chemicals including gases pumps or vessels of porcelain, stoneware or the like are exclusively used, but this material is not equal to the great mechanical strains involved, and only the present method makes it possible to produce pumps from acid-proof material, which will be capable of withstanding such strains.

Figs. 8 and 9 show two different sectional views of the vane wheel of a rotary pump. In the manufacture of this wheel the flanges A, B and the blade bodies C are formed independently from one another and then united during the hardening step.

To produce the part A, thread layers *d* extending concentrically to the axis of rotation are wound up on a mandrel corresponding to the bore *o* and between them axially extending intermediate layers *e* are inserted. Corresponding to the form of the member A, thread layers *f* extending like a funnel are then disposed between the layers *d*. The member B is made in the same way and, in the example shown, formed from the thread layers D and F, whereupon the blade bodies C are manufactured which, in the

present instance, are formed by the thread layers *p* extending in the direction of the plane of the blade.

The connection of the blade bodies C with the side parts *a*, *d* is automatically effected during the hardening step, since the at first still viscous parts will be brought together under pressure during the hardening process and firmly agglomerate. The artificial resin masses of the various parts flow, as it were, into each other and thus combine the parts A, B, C into a whole.

The position, direction and thickness of the various thread layers depends entirely on the amount and direction of mechanical strain and on the form of the object to be produced. Instead of threads, woven or plaited bands, cords or the like may be employed, and besides the vane wheel of a pump, as in the present instance, all other parts of a pump or a blower, such as the casing and the connecting conduits, may be produced in the same manner.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1.—A method of producing non-metallic objects capable of resisting chemical and physical influences, characterised in that the objects are formed from threads, saturated with resin unaffected by chemicals and capable of being hardened, which are superposed in layers extending in different directions, the direction and thickness of the layers being determined by the direction and magnitude of mechanical strain.

2.—A method according to claim 1, characterised in that the threads consist of asbestos.

3.—A method of producing objects according to claim 1, characterised in that the layers are formed by closely placing the threads side by side, the number and direction of the layers of thread thus formed depending on the direction and magnitude of the forces acting on the object and on the form of the object.

4.—A method according to claim 1, characterised in that the threads saturated with artificial resin unaffected by chemicals and capable of being hardened are wound over forming members which are removed from the object to form hollow bodies.

5.—A method of producing objects according to claim 1, characterised in that for the production of plates wooden forming members are employed over which the threads saturated with artificial resin unaffected by chemicals and capable of being hardened are wound so as to form layers arranged crosswise one upon the other.

6.—A method of producing objects according to claim 1, characterised in that for the production of casings for pumps or blowers layers extending partly concentrically to the axis of rotation and partly radially thereto are formed from the threads saturated with artificial resin unaffected by chemicals and capable of being hardened.

7.—A method of producing objects according to claim 6, characterised in that the radially extending layers have a funnel-like shape.

8.—A method of producing objects according to claim 1, characterised in that in the production of vane wheels for pumps or blowers the wheels are formed from the two lateral flanges and interposed vane bodies, the lateral flanges being formed from threads extending partly concentrically to the axis of rotation and partly radially thereto and being saturated with artificial resin unaffected by chemicals and capable of being hardened, the vane bodies being formed from saturated threads extending in the direction of the plane of the vanes, all parts being united by pressure during the hardening step.

Dated the 12th day of July, 1932.

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321, St. John Street, London, E.C. 1,
Registered Patent Agents.

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